CURRENT STATUS OF ALL CLAIMS AS AMENDED

1. (currently amended) A method for providing a frequency standard signal, comprising:

acquiring a global positioning system (GPS) signal using an acquisition time period of at least two GPS data bit times for determining correlation sums for code phases, respectively;

carrier-less tracking said GPS signal, after said GPS signal has been acquired, for providing a clock bias error; and

disciplining said frequency standard signal with said clock bias error for tracking said GPS carrier frequency; wherein:

said GPS signal is less than or equal to about -146 dBm.

2. (original) The method of claim 1, wherein:

carrier-less tracking includes estimating Doppler shifts of said GPS signal from GPS orbital data; and using said estimated Doppler shifts for tracking said GPS signal frequency without frequency feedback correction from said GPS signal.

3. (original) The method of claim 1, wherein:

said acquisition time period includes a plurality of coherent integration periods each covering at least ten epochs of said code phases; and

acquiring includes determining a plurality of correlation levels for said plurality of coherent integration periods, respectively, for said code phases; and then incoherently combining said correlation levels at corresponding ones of said code phases for providing said correlation sums.

4. (currently amended) ~~The method of claim 3, wherein:~~ A method for providing a frequency standard signal, comprising:

acquiring a global positioning system (GPS) signal using an acquisition time period of at least two GPS data bit times for determining correlation sums for code phases, respectively;

carrier-less tracking said GPS signal, after said GPS signal has been acquired, for providing a clock bias error; and

disciplining said frequency standard signal with said clock bias error for tracking said GPS carrier frequency; wherein:

said acquisition time period includes a plurality of coherent integration periods each covering at least ten epochs of said code phases;

acquiring includes determining a plurality of correlation levels for said plurality of coherent integration periods, respectively, for said code phases; and then incoherently combining said correlation levels at corresponding ones of said code phases for providing said correlation sums; and

incoherently combining includes summing squares of at least first and second said correlation levels corresponding to at least first and second said coherent integration periods.

5. (currently amended) ~~The method of claim 1, wherein:~~ A method for providing a frequency standard signal, comprising:

acquiring a global positioning system (GPS) signal using an acquisition time period of at least two GPS data bit times for determining correlation sums for code phases, respectively;

carrier-less tracking said GPS signal, after said GPS signal has been acquired, for providing a clock bias error; and

disciplining said frequency standard signal with said clock bias error for tracking said GPS carrier frequency; wherein:

said acquisition time period includes an extended coherent integration period having a plurality of coherent integration periods each covering at least forty epochs of said code phases; and

acquiring includes determining a plurality of correlation levels for a plurality of coherent integration periods, respectively, for said code phases; stripping GPS data bit senses from said correlation levels for providing data stripped correlation levels; and then coherently combining said data stripped correlation levels at corresponding ones of said code phases for providing said correlation sums for said extended coherent integration period.

6. (original) The method of claim 5, wherein:

coherently combining includes summing at least first and at least second said data stripped correlation levels corresponding to first and second said coherent integration periods.

7. (original) The method of claim 1, wherein:

disciplining said frequency standard signal includes monitoring said clock bias error for predicting a frequency drift for said frequency standard signal while said GPS signal is being tracked; and using said predicted frequency drift for adjusting said clock bias error for compensating for said frequency drift when said GPS signal is not being tracked.

8. (original) The method of claim 7, wherein:

predicting said frequency drift includes determining at least one of aging and temperature dependence for said frequency standard signal.

9. (canceled)

10. (currently amended) ~~The method of claim 1, wherein:~~ A method for providing a frequency standard signal, comprising:

acquiring a global positioning system (GPS) signal using an acquisition time period of at least two GPS data bit times for determining correlation sums for code phases, respectively;

carrier-less tracking said GPS signal, after said GPS signal has been acquired, for providing a clock bias error; and

disciplining said frequency standard signal with said clock bias error for tracking said GPS carrier frequency; wherein:

acquiring said GPS signal includes using coherent integration times for said acquisition time periods for a processing gain of at least 16 dB with respect to a coherent integration time of one millisecond.

11. (currently amended) A GPS clock using a GPS signal for providing a frequency standard signal, comprising:

a long integration correlation machine for acquiring a global positioning system (GPS) signal using an acquisition time period of at least two GPS data bit times for determining correlation sums for code phases, respectively;

a signal tracking loop using the correlation machine for carrier-less tracking said GPS signal, after said GPS signal has been acquired, for providing a clock bias error; and

a clock bias loop including the signal tracking loop for disciplining said frequency standard signal with said clock bias error for tracking said GPS carrier frequency; wherein:

said GPS signal is less than or equal to about -146 dBm.

12. (original) The GPS clock of claim 11, wherein:

the signal tracking loop estimates Doppler shifts of said GPS signal from GPS orbital data; and uses said estimated Doppler shifts for tracking said GPS signal frequency without frequency feedback correction from said GPS signal.

13. (original) The GPS clock of claim 11, wherein:

said acquisition time period includes a plurality of coherent integration periods each covering at least ten epochs of said code phases; and

the long integration correlation machine determines a plurality of correlation levels for said plurality of coherent integration periods, respectively, for said code phases; and then incoherently combines said correlation levels at corresponding ones of said code phases for providing said correlation sums.

14. (currently amended) ~~The GPS clock of claim 13, wherein:~~ <u>A GPS clock using a GPS signal for providing a frequency standard signal, comprising:</u>

<u>a long integration correlation machine for acquiring a global positioning system (GPS) signal using an acquisition time period of at least two GPS data bit times for determining correlation sums for code phases, respectively;</u>

<u>a signal tracking loop using the correlation machine for carrier-less tracking said GPS signal, after said GPS signal has been acquired, for providing a clock bias error; and</u>

<u>a clock bias loop including the signal tracking loop for disciplining said frequency standard signal with said clock bias error for tracking said GPS carrier frequency; wherein:</u>

<u>said acquisition time period includes a plurality of coherent integration periods each covering at least ten epochs of said code phases;</u>

<u>the long integration correlation machine determines a plurality of correlation levels for said plurality of coherent integration periods, respectively, for said code phases; and then incoherently combines said correlation levels at corresponding ones of said code phases for providing said correlation sums; and</u>

the long integration correlation machine combines said correlation levels by summing squares of at least first and second said correlation levels corresponding to at least first and second said coherent integration periods.

15. (currently amended) ~~The GPS clock of claim 11, wherein:~~ <u>A GPS clock using a GPS signal for providing a frequency standard signal, comprising:</u>

a long integration correlation machine for acquiring a global positioning system (GPS) signal using an acquisition time period of at least two GPS data bit times for determining correlation sums for code phases, respectively;

a signal tracking loop using the correlation machine for carrier-less tracking said GPS signal, after said GPS signal has been acquired, for providing a clock bias error; and

a clock bias loop including the signal tracking loop for disciplining said frequency standard signal with said clock bias error for tracking said GPS carrier frequency; wherein:

said acquisition time period includes an extended coherent integration period having a plurality of coherent integration periods each covering at least forty epochs of said code phases; and

the long integration correlation machine coherently determines a plurality of correlation levels for a plurality of coherent integration periods, respectively, for said code phases; strips GPS data bit senses from said correlation levels for providing data stripped correlation levels; and then coherently combines said data stripped correlation levels at corresponding ones of said code phases for providing said correlation sums for said extended coherent integration period.

16. (original) The GPS clock of claim 15, wherein:

the long integration correlation machine combines said data stripped correlation levels by summing at least first and second said data stripped correlation levels corresponding to at least first and second said coherent integration periods.

17. (original) The GPS clock of claim 11, wherein:

the clock bias loop includes a holdover driver for monitoring said clock bias error while the signal tracking loop is carrier-less tracking said GPS signal for predicting a frequency drift for said frequency standard signal; and using said predicted frequency drift for adjusting said clock bias error for compensating for said frequency drift when said GPS signal is not being tracked.

18. (original) The GPS clock of claim 17, wherein:

said holdover driver predicts said frequency drift by determining at least one of aging and temperature dependence for said frequency standard signal.

19. (canceled)

20. (currently amended) ~~The GPS clock of claim 11, wherein:~~ A GPS clock using a GPS signal for providing a frequency standard signal, comprising:

a long integration correlation machine for acquiring a global positioning system (GPS) signal using an acquisition time period of at least two GPS data bit times for determining correlation sums for code phases, respectively;

a signal tracking loop using the correlation machine for carrier-less tracking said GPS signal, after said GPS signal has been acquired, for providing a clock bias error; and

a clock bias loop including the signal tracking loop for disciplining said frequency standard signal with said clock bias error for tracking said GPS carrier frequency; wherein:

the long integration correlation machine uses coherent acquisition integration periods for a processing gain of at least 16 dB with respect to a processing gain for a coherent integration period of one millisecond.

21. (new) The method of claim 4, wherein:

carrier-less tracking includes estimating Doppler shifts of said GPS signal from GPS orbital data; and using said estimated Doppler shifts for tracking said GPS signal frequency without frequency feedback correction from said GPS signal.

22. (new) The method of claim 4, wherein:

disciplining said frequency standard signal includes monitoring said clock bias error for predicting a frequency drift for said frequency standard signal while said

GPS signal is being tracked; and using said predicted frequency drift for adjusting said clock bias error for compensating for said frequency drift when said GPS signal is not being tracked.

23. (new) The method of claim 22, wherein:

predicting said frequency drift includes determining at least one of aging and temperature dependence for said frequency standard signal.

24. (new) The method of claim 5, wherein:

carrier-less tracking includes estimating Doppler shifts of said GPS signal from GPS orbital data; and using said estimated Doppler shifts for tracking said GPS signal frequency without frequency feedback correction from said GPS signal.

25. (new) The method of claim 5, wherein:

disciplining said frequency standard signal includes monitoring said clock bias error for predicting a frequency drift for said frequency standard signal while said GPS signal is being tracked; and using said predicted frequency drift for adjusting said clock bias error for compensating for said frequency drift when said GPS signal is not being tracked.

26. (new) The method of claim 25, wherein:

predicting said frequency drift includes determining at least one of aging and temperature dependence for said frequency standard signal.

27. (new) The method of claim 10, wherein:

carrier-less tracking includes estimating Doppler shifts of said GPS signal from GPS orbital data; and using said estimated Doppler shifts for tracking said GPS signal frequency without frequency feedback correction from said GPS signal.

28. (new) The method of claim 10, wherein:

disciplining said frequency standard signal includes monitoring said clock bias error for predicting a frequency drift for said frequency standard signal while said GPS signal is being tracked; and using said predicted frequency drift for adjusting said clock bias error for compensating for said frequency drift when said GPS signal is not being tracked.

29. (new) The method of claim 28, wherein:

predicting said frequency drift includes determining at least one of aging and temperature dependence for said frequency standard signal.

30. (new) The GPS clock of claim 14, wherein:

the signal tracking loop estimates Doppler shifts of said GPS signal from GPS orbital data; and uses said estimated Doppler shifts for tracking said GPS signal frequency without frequency feedback correction from said GPS signal.

31. (new) The GPS clock of claim 14, wherein:

the clock bias loop includes a holdover driver for monitoring said clock bias error while the signal tracking loop is carrier-less tracking said GPS signal for predicting a frequency drift for said frequency standard signal; and using said predicted frequency drift for adjusting said clock bias error for compensating for said frequency drift when said GPS signal is not being tracked.

32. (new) The GPS clock of claim 31, wherein:

said holdover driver predicts said frequency drift by determining at least one of aging and temperature dependence for said frequency standard signal.

33. (new) The GPS clock of claim 15, wherein:

the signal tracking loop estimates Doppler shifts of said GPS signal from GPS orbital data; and uses said estimated Doppler shifts for tracking said GPS signal frequency without frequency feedback correction from said GPS signal.

34. (new) The GPS clock of claim 15, wherein:

the clock bias loop includes a holdover driver for monitoring said clock bias error while the signal tracking loop is carrier-less tracking said GPS signal for predicting a frequency drift for said frequency standard signal; and using said predicted frequency drift for adjusting said clock bias error for compensating for said frequency drift when said GPS signal is not being tracked.

35. (new) The GPS clock of claim 34, wherein:

said holdover driver predicts said frequency drift by determining at least one of aging and temperature dependence for said frequency standard signal.

36. (new) The GPS clock of claim 15, wherein:

the signal tracking loop estimates Doppler shifts of said GPS signal from GPS orbital data; and uses said estimated Doppler shifts for tracking said GPS signal frequency without frequency feedback correction from said GPS signal.

37. (new) The GPS clock of claim 15, wherein:

the clock bias loop includes a holdover driver for monitoring said clock bias error while the signal tracking loop is carrier-less tracking said GPS signal for predicting a frequency drift for said frequency standard signal; and using said predicted frequency drift for adjusting said clock bias error for compensating for said frequency drift when said GPS signal is not being tracked.

38. (new) The GPS clock of claim 37, wherein:

said holdover driver predicts said frequency drift by determining at least one of aging and temperature dependence for said frequency standard signal.